CLAIMS

What is claimed is:

1. A method of designing a biodegradable/bioresorbable tissue augmentation/reconstruction device, said method comprising:

creating a material density distribution within a device design shape for discrete points during a material degradation lifecycle;

weighting said material density distribution using a weighting factor to determine a weighted density;

using said weight density to determine a material reinforcement of said device such that said device will retain predetermined structural properties during said material degradation lifecycle.

2. The method according to Claim 1 wherein said material density distribution is creating using a technique chosen from the group consisting essentially of topology optimization, microstructure topology optimization, restricted topology optimization, image-based design, and computer-aided design techniques.

3. The method of Claim 2 wherein said topology optimization includes an algorithm employed to define said material density distribution at predetermined time points during said material degradation lifecycle.

4. The method of Claim 2 wherein said image-based design includes defining said material density distribution at predetermined time points during said material degradation lifecycle.

5. The method of Claim 2 wherein said general computer aided design techniques include defining said material density distribution at predetermined time points during said material degradation lifecycle.

6. The method according to Claim 1 wherein said weighting factor is chosen from the group consistently essentially of a linear weighting factor, a nonlinear weighting factor, a time past degradation factor, and a ratio of a degraded material property to initial material property.

7. The method according to Claim 6 wherein said ratio of a degraded material property to initial material property includes a ratio of a degraded modulus to an initial modulus.

8. The method according to Claim 6 wherein said ratio of a degraded material property to initial material property includes a ratio of a degraded strength to an initial strength.

9. The method according to Claim 6 wherein said ratio of a degraded material property to initial material property includes a ratio of a degraded thermal conductivity to an initial thermal conductivity.

10. The method according to Claim 6 wherein said ratio of a degraded material property to initial material property includes a ratio of a degraded electrical conductivity to an initial electrical conductivity.

11. The method according to Claim 1, further comprising:

superposing said material density distribution at predetermined time points using both time, degraded base stiffness, and said weighting factor.

12. The method according to Claim 1, further comprising:

superposing said material density distribution at predetermined time points using density at a global anatomic level.

13. The method according to Claim 12, further comprising:

superposing said material density distribution at predetermined time points using density at a physical size smaller than said global anatomic level.

14. The method according to Claim 1 wherein said weighting said material density distribution using a weighting factor to determine a weighted density further includes employing material degradation kinetics to enhance said material density distribution.

15. The method according to Claim 14 wherein said employing material degradation kinetics further comprises employing one chosen from the group consisting essentially of polylactic acid, polyglycolic acid, polyanhdyride, polycaprolactone, tri-calcium phosphate, and hydrogels.

16. A method of manufacturing a biodegradable/bioresorbable tissue augmentation/reconstruction device, said method comprising:

dividing the device into elements having a predicted material density between 0 and 1;

weighting each predicted material density by a predetermined degradation profile to define a weighted material density, said degradation profile being unique to a material used; and

calculating a material weight in each of said element by applying a time lasting factor and a degrading modulus factor such that high load bearing regions within said device are reinforced to compensate for subsequent stiffness degradation due to bulk erosion of said device.

17. The method according to Claim 16, further comprising:

converting said weighted material density to surface representation for manufacture.

18. The method according to Claim 17 wherein said converting said weighted material density to surface representation for manufacture includes converting said weighted material density to a STL surface representation.

19. The method according to Claim 17 wherein said converting said weighted material density to surface representation for manufacture includes converting said weighted material density to a Computer Aided Design (CAD) surface.

20. The method according to Claim 17 wherein said converting said weighted material density to surface representation for manufacture includes converting said weighted material density to a wireframe representation.